

ONTARIO MINISTRY OF ENVIRONMENT



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# **BURLINGTON**

*Elizabeth Gardens*

**water pollution  
control plant**

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1967  
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ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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**1967**

Burlington Elizabeth Gardens :  
water pollution control plant.  
81235



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET, TORONTO 5  
OFFICE OF THE GENERAL MANAGER

Members of the Burlington Elizabeth Gardens Local Advisory Committee  
Town of Burlington.

Gentlemen:

We are happy to present you with the 1967 Operating Summary for the  
Burlington Elizabeth Gardens Water Pollution Control Plant, OWRC  
Project No. 2-0028-58.

Your co-operation with our staff throughout the year has been appreciated.  
Only with such co-operation can the war against water pollution be waged  
effectively.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly".

D. S. Caverly,  
General Manager.



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ONTARIO WATER  
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ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET  
TORONTO 5

TELEPHONE 365.

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CHAIRMAN

J. H. H. ROOT, M.P.P.  
VICE-CHAIRMAN

D. S. CAVERLY  
GENERAL MANAGER

W. S. MACDONNELL  
COMMISSION SECRETARY

General Manager,  
Ontario Water Resources Commission.

Dear Sir:


I am pleased to submit to you the 1967 Operating Summary for the Burlington Elizabeth Gardens Water Pollution Control Plant, OWRC Project No. 2-0028-58.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

A handwritten signature in dark ink, reading "D. A. McTavish".

D. A. McTavish, P. Eng.,  
Director,  
Division of Plant Operations.



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## FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.





**BURLINGTON**  
Elizabeth Gardens  
**water pollution control plant**  
operated for

THE TOWN OF BURLINGTON

by the

ONTARIO WATER RESOURCES COMMISSION

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VICE-CHAIRMAN: J. H. H. Root, M. P. P.

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W. S. MacDonnell

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DIVISION OF PLANT OPERATIONS

DIRECTOR: D. A. McTavish

Assistant Director: C. W. Perry

Regional Supervisor: A. C. Beattie

Operations Engineer: R. S. McKittrick

801 Bay Street Toronto 5



## **'67 REVIEW**

The Burlington Elizabeth Gardens plant treated a total of 383.66 million gallons raw sewage during 1967 at a total operating cost of \$24,427.22. The operating costs per million gallons was reduced from \$80.25 in 1966 to \$66.67 in 1967. The cost per pound of BOD removed remains the same at 7 cents.

The average daily flow during the year was 1.05 million gallons, and the design flow of 0.75 million gallons per day was exceeded 90 percent of the time. Metering equipment is not available for that portion of the flow by-passed on the Lakeshore trunk sewer or from the plant overflow.

The average raw sewage BOD and suspended solids concentrations were reduced from the 1966 values of 127 ppm and 153 ppm respectively to 102 ppm and 128 ppm respectively. This reflects the continued dilution of raw sewage through infiltration of ground and storm waters into the sanitary collection system.

## PROJECT COSTS

NET CAPITAL COST (Estimated) Long Term Debt to OWRC	<u>\$382,773.39</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	<u>\$129,800.01</u>
Net Operating	\$ 24,427.22
Debt Retirement	13,887.00
Reserve	1,816.08
Interest Charged	21,585.92
	<hr/>
TOTAL	\$ <u>61,716.22</u>

### RESERVE ACCOUNT

Balance at January 1, 1967	\$ 14,094.68
Deposited by Municipality	1,816.08
Interest Earned	<u>832.56</u>
	\$ 16,743.32
Less Expenditures	<u>(228.64)</u>
Balance at December 31, 1967	\$ <u>16,514.68</u>

## MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	1,352.56	986.29		49.04		38.31	61.77	(85.31)		302.46
FEB	1,606.57	972.27		296.64		31.32		45.58	208.72	49.04
MARCH	3,369.95	1,647.07	273.70	325.28	228.38	78.37	40.26	594.76	153.09	49.04
APRIL	1,716.65	1,038.74		301.39		98.04		57.37	172.07	49.04
MAY	1,837.04	1,108.82	175.49	287.02	(121.62)	61.14		189.85	87.30	49.04
JUNE	2,083.16	1,013.94		271.69	350.00	81.94		103.83	212.67	49.04
JULY	1,922.84	1,056.35	144.90	255.54		79.44		153.36	184.21	49.04
AUG	2,067.54	1,242.51		258.19	228.38	95.15		7.17	192.80	43.34
SEPT	2,683.63	1,610.94		225.32	46.87	78.12		512.87	160.47	49.04
OCT	1,839.40	1,065.81				526.44		174.55	132.60	
NOV	1,869.44	659.44		287.61	269.54	48.01		156.75	399.05	49.04
DEC	1,998.44	647.49	154.22	363.65		35.94	290.80	2.83	454.47	49.04
TOTAL	24,427.22	13,049.67	748.31	2921.37	1001.55	1252.22	392.83	1916.66	2357.45	787.16

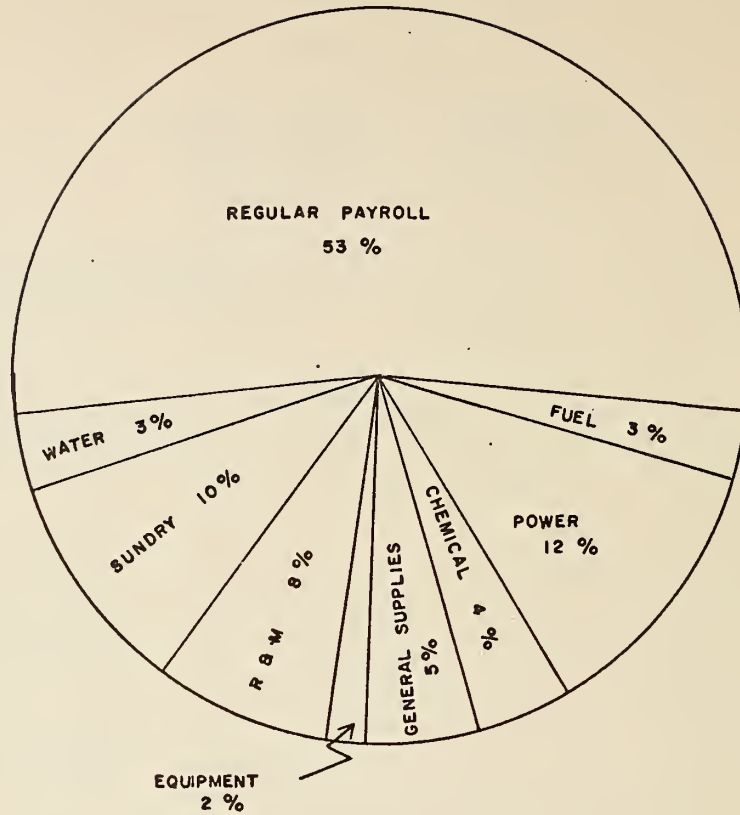
\* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$1,600.20  
BRACKETS INDICATE CREDIT

## YEARLY OPERATING COSTS

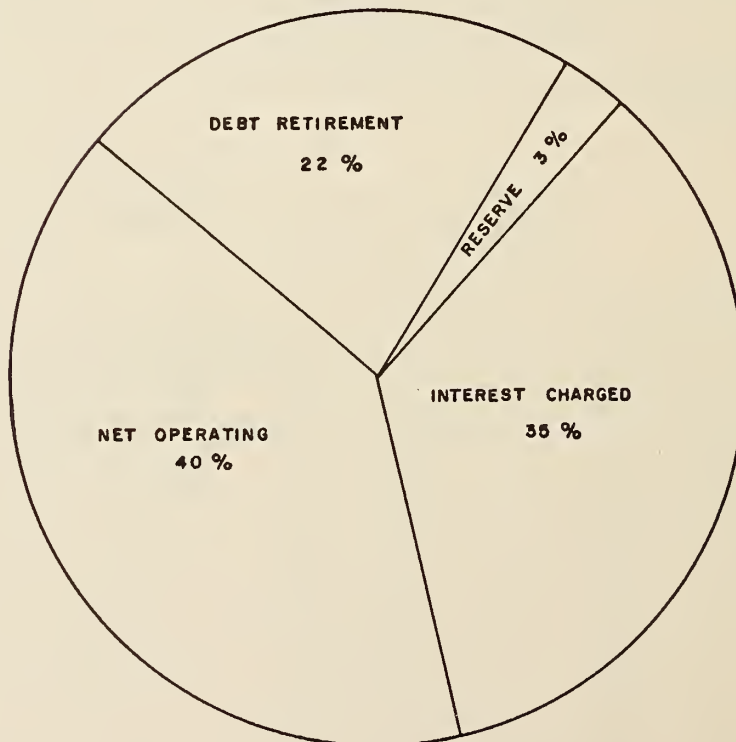
YEAR	M. G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1961	172.733	\$23,541	\$136.25	4 CENTS
1962	156.921	21,800	139.00	4 CENTS
1963	221.120	26,010	120.50	4 CENTS
1964	235.486	21,958	93.24	6 CENTS
1965	299.865	21,966.58	73.25	6 CENTS
1966	297.759	23,894.31	80.25	7 CENTS
1967	383.603	24,427.22	63.67	7 CENTS



## 1967 OPERATING COSTS



## TOTAL ANNUAL COST



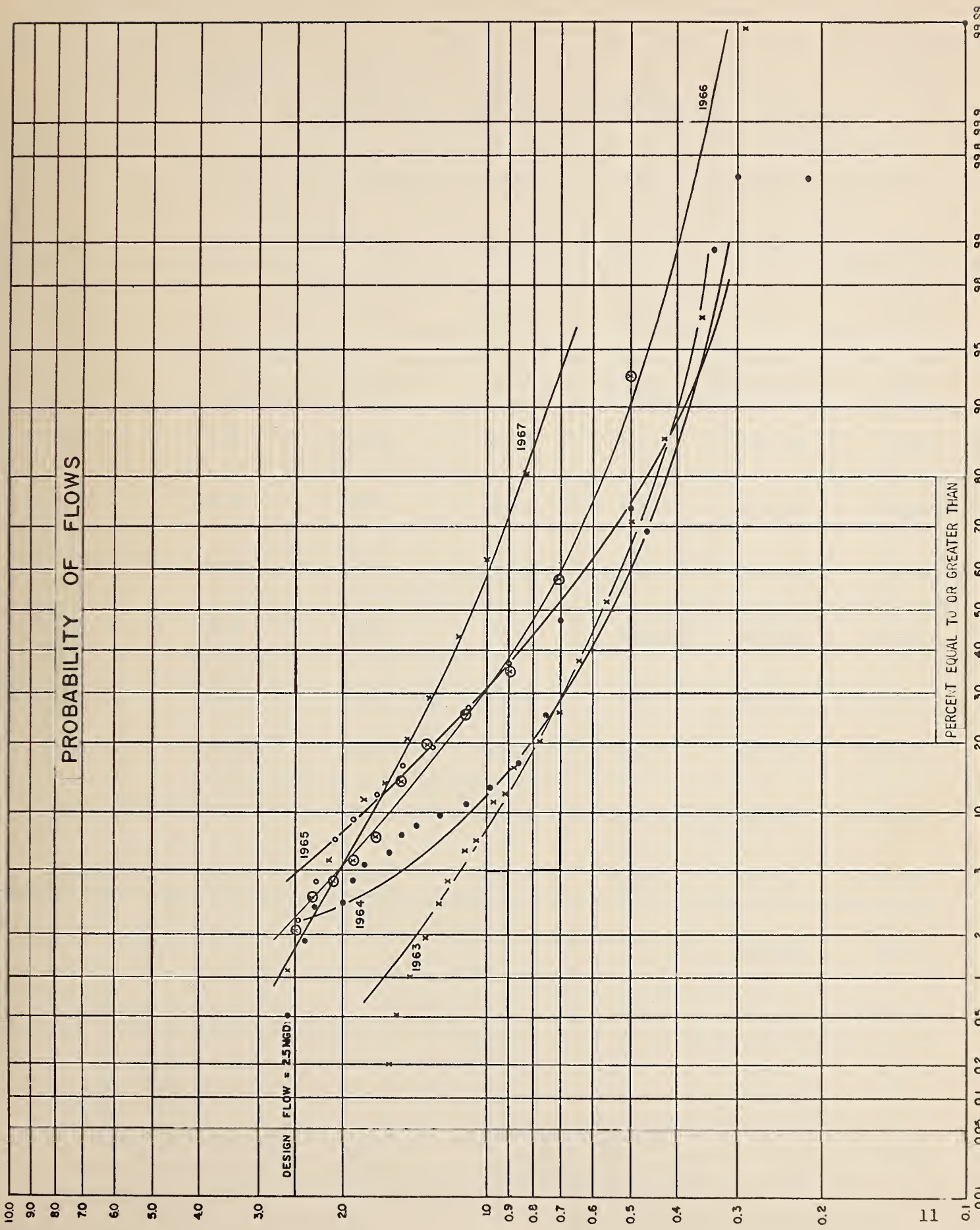


## Process Data

A total of 383.66 million gallons of sewage was treated at the Elizabeth Gardens plant during 1967. This represents an increase of 29 percent over 1966. The average daily flow was 1.05 million gallons for the year and 1.44 million gallons for the peak month of April.

The above flow totals represent only that portion of the raw sewage flow which was given some form of treatment at the plant. During high flow periods, there was considerable bypassing of raw sewage on the Lakeshore trunk sewer. However, this is not metered. During the latter months of 1967, the sequence of operation of the raw sewage pumps was altered to prevent excessive hydraulic loading and to prevent the washout of sludge solids. Before this modification, there were several periods during the year when treatment was inadequate while activated sludge solids were built up following a washout.

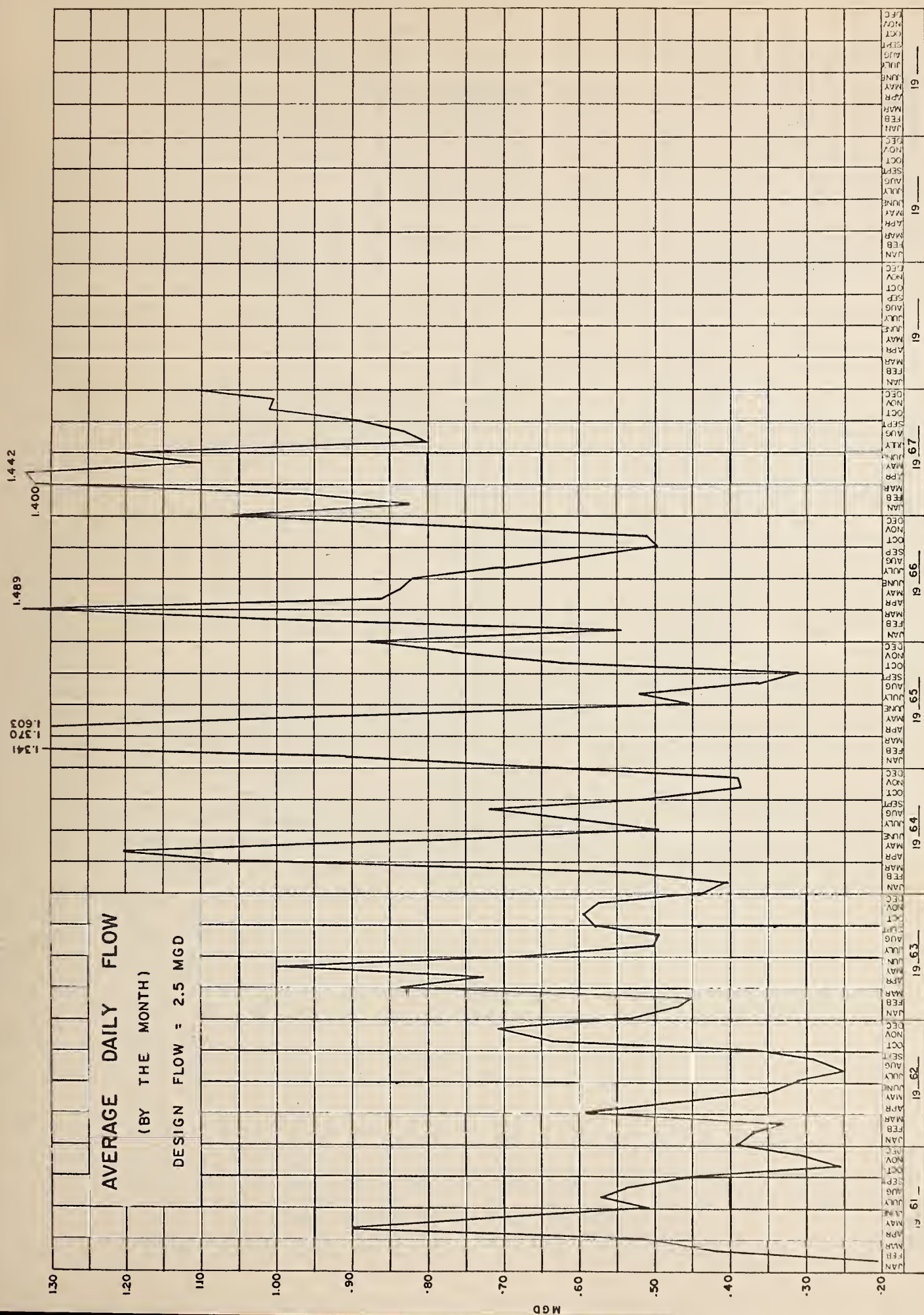
The design capacity of the plant, 0.75 mgd, was exceeded 89 percent of the time during the past year.

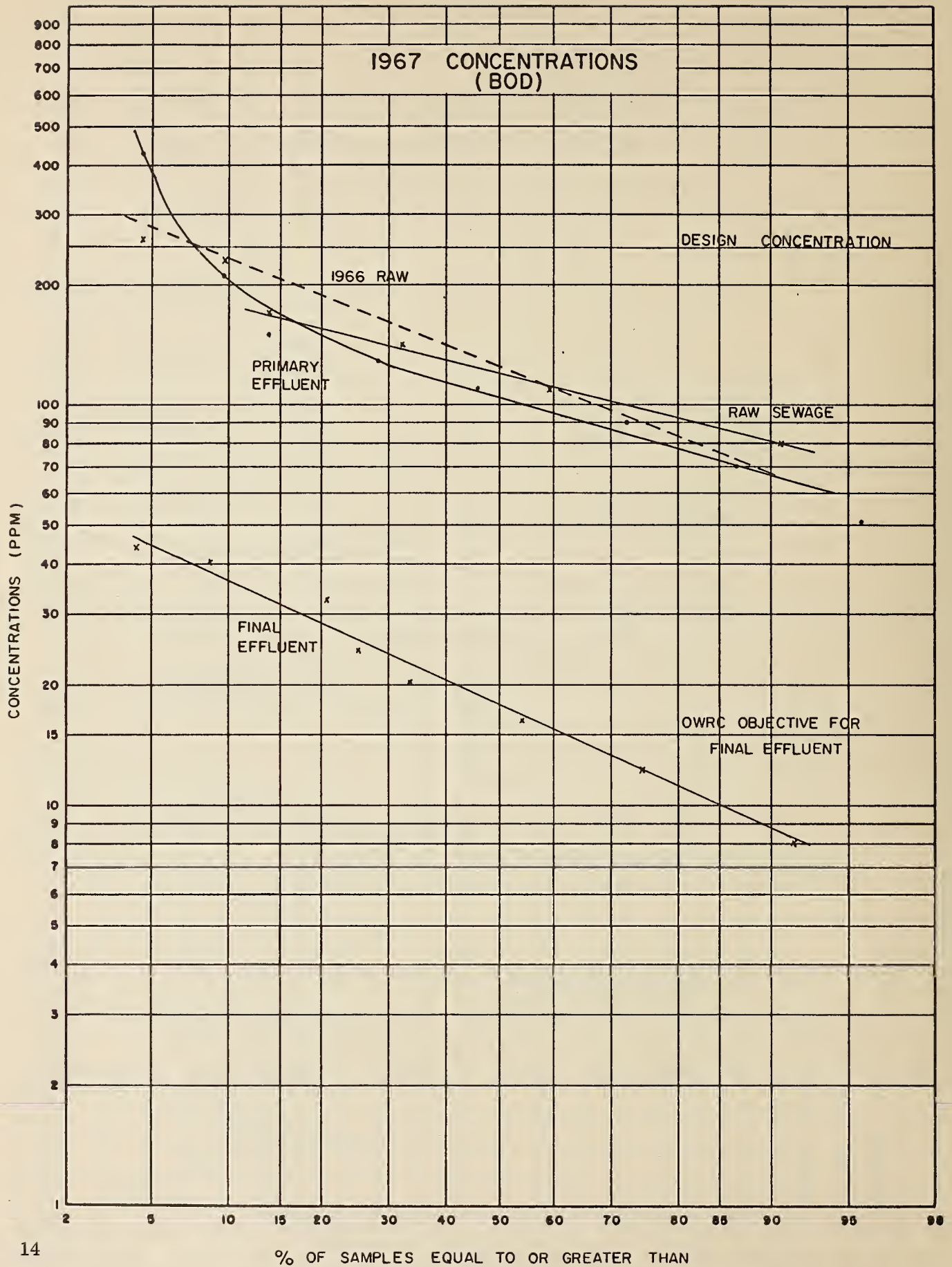


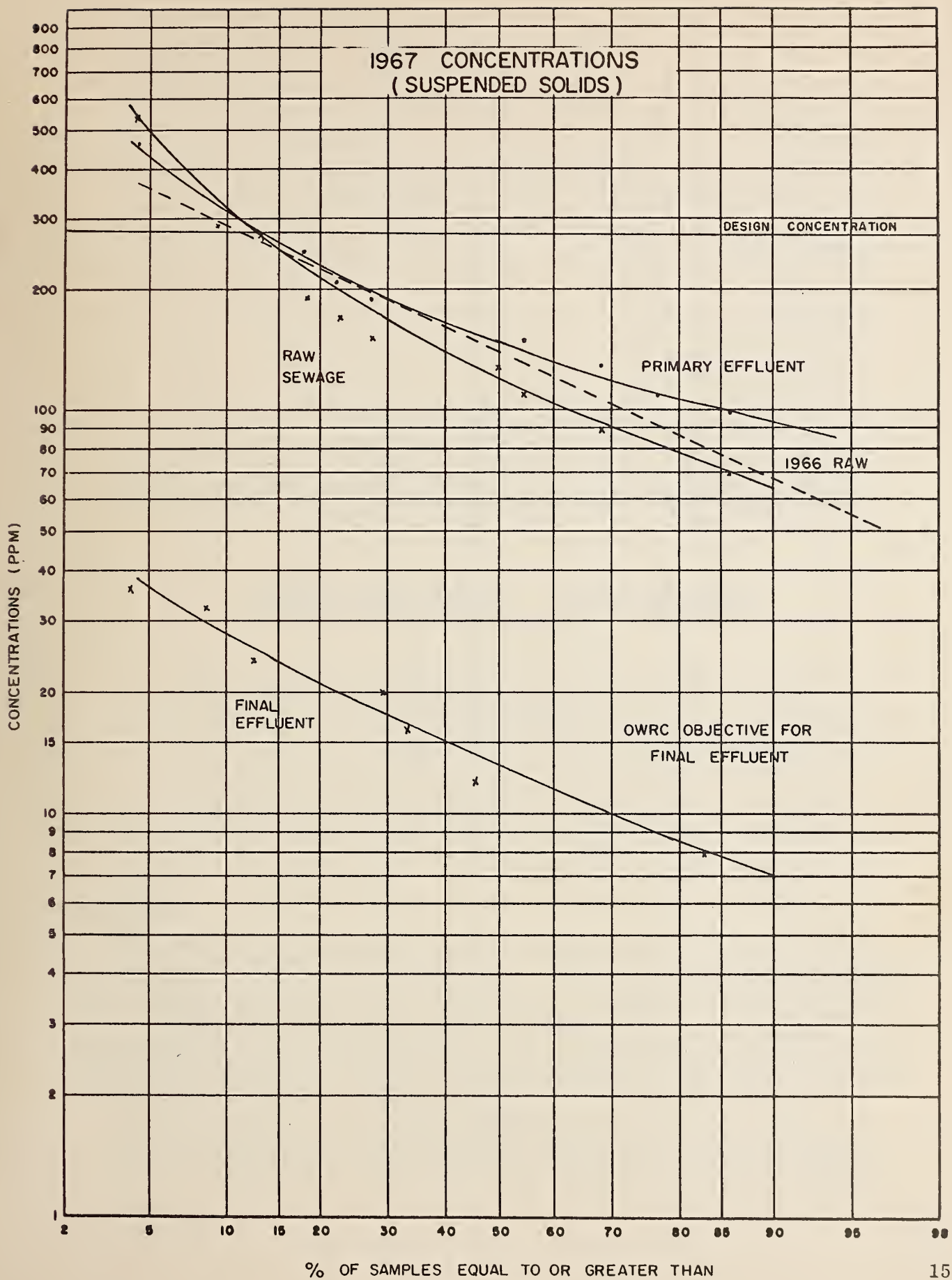
# FLOW DATA

Month	Total Flow (MG)	Avg. Daily Flow (MGD)	Max. Daily Flow (MG)	Min Daily Flow (MG)	Max. Rate (MGD)	Min. Rate (MGD)
January	25.495	.822	2.010	.528	2.5	.001
February	26.994	.964	1.795	.601	2.5	.001
March	43.421	1.400	2.303	.574	2.4	.001
April	43.252	1.442	2.490	.849	2.4	.001
May	34.177	1.102	2.450	.676	2.4	.001
June	36.614	1.220	2.354	.660	2.4	.001
July	24.875	.802	1.522	.590	2.4	.001
August	25.956	.837	2.036	.532	2.4	.001
September	26.826	.894	2.405	.614	2.4	.001
October	31.392	1.013	2.188	.631	2.5	.001
November	30.258	1.009	1.948	.751	2.4	.000
December	34.403	1.110	1.366	.656	1.5	.001
Total	383.663					
Average	31.972	1.051				

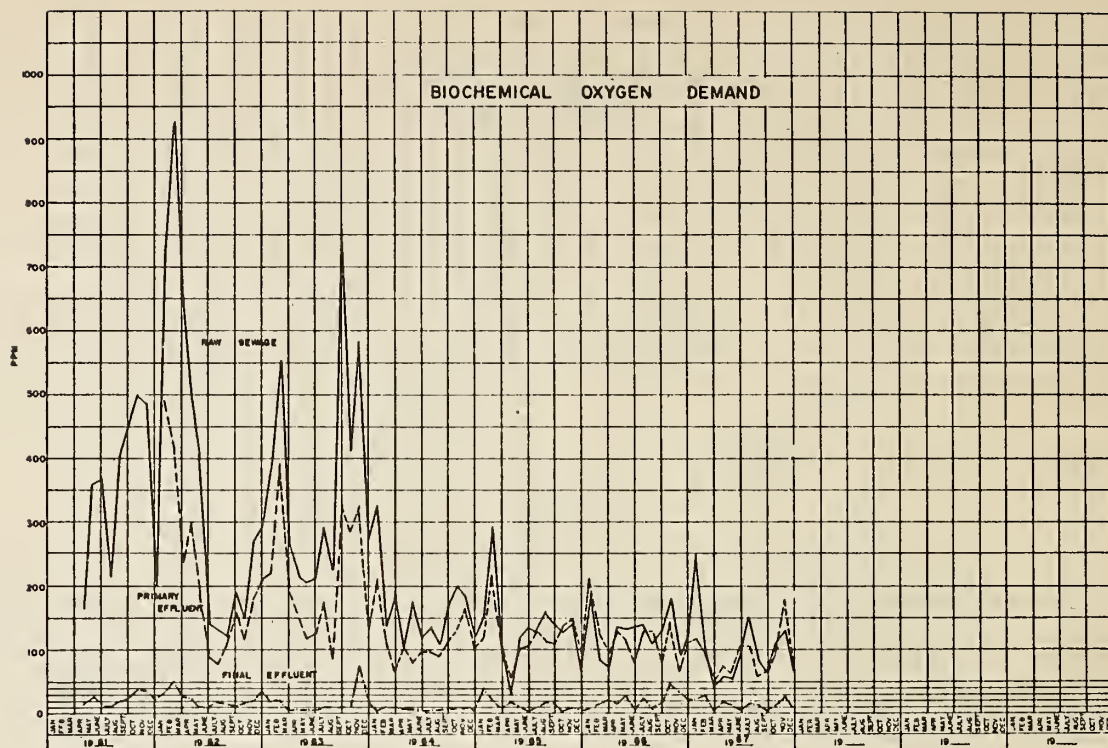




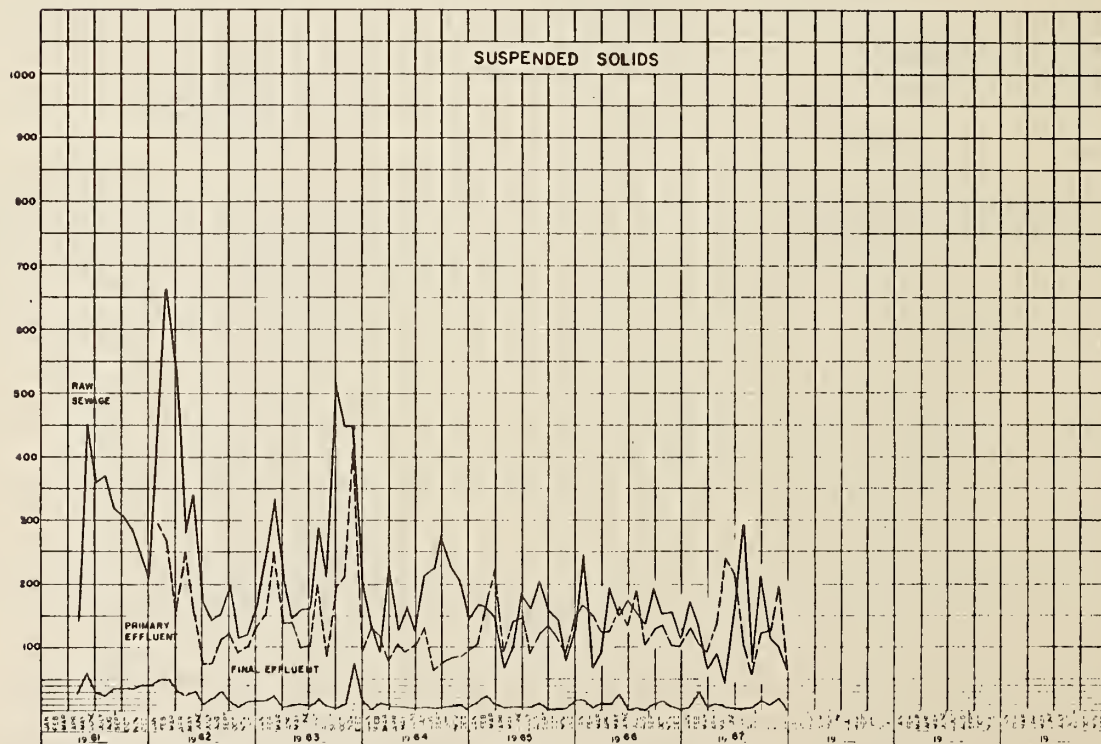








## MONTHLY VARIATIONS



## GRIT, B.O.D AND S.S. REMOVAL

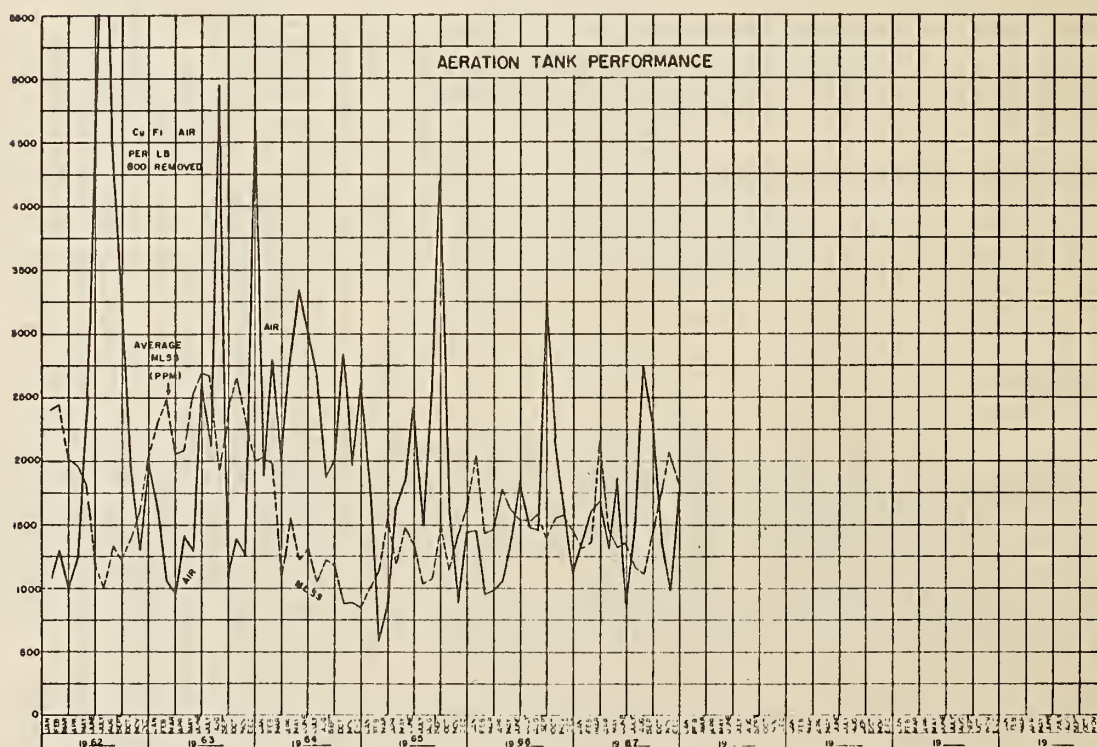
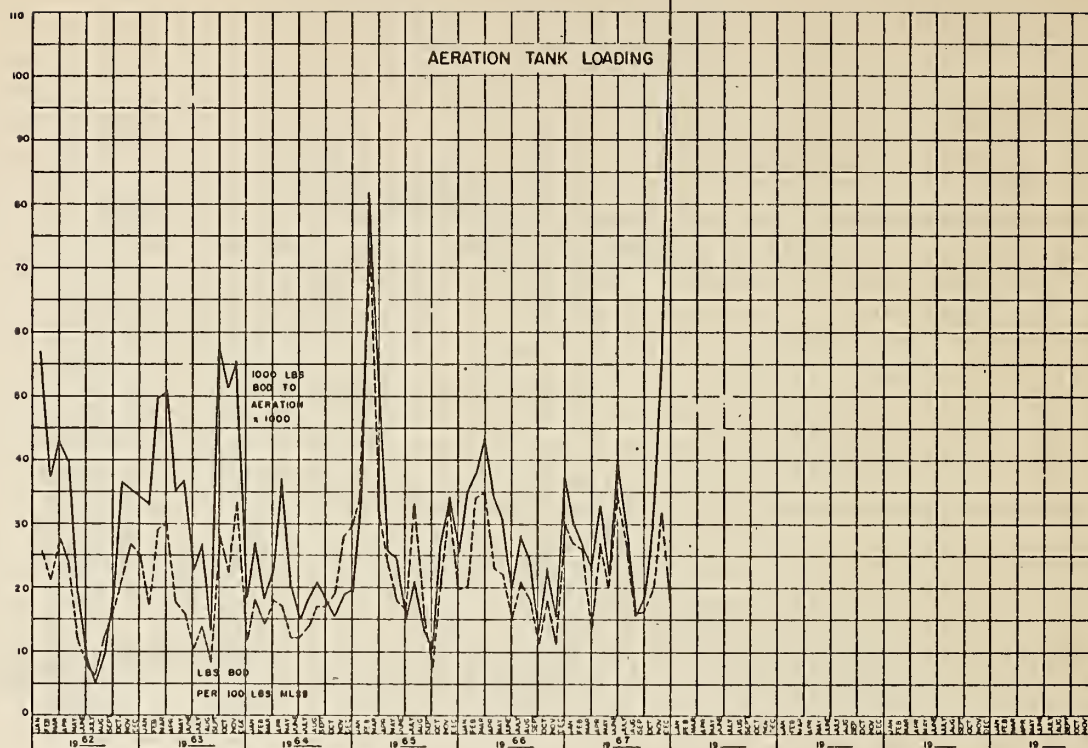
MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	250	24	90.4	28.81	178	5	86.5	22.05	29
FEB.	108	29.6	72.6	10.58	131	32	75.6	13.36	20
MAR.	43	7.5	82.6	7.71	64	8	87.5	12.16	52
APR.	59	18.9	68.0	8.67	98	14	85.7	18.17	18
MAY	55	14	74.5	7.01	42	9	78.6	5.64	40
JUNE	91	8	91.2	15.20	165	7	95.8	28.92	62
JULY	151	16	89.4	16.79	292	5	98.3	35.70	49
AUG.	83	13	84.3	9.08	68	5	92.6	8.18	47
SEPT.	67	7	89.6	8.05	214	19	91.1	26.16	67
OCT.	110	12	89.1	15.38	118	11	90.7	16.79	36
NOV.	131	25	80.9	16.04	102	20	80.4	12.40	51
DEC.	74	9.8	86.8	11.04	67	4	94.0	10.84	47
TOTAL	-	-	-	154.36	-	-	-	210.37	518
AVG.	102	15.4	83.3	12.86	128	12	88.1	17.53	43

### COMMENTS

The average raw sewage BOD and suspended solids concentrations during the year were 102 ppm and 128 ppm respectively. These values are lower than the 1966 averages, reflecting dilution of the raw sewage through infiltration of ground and storm water. The average BOD and suspended solids reductions were 83.3 and 88.1 percent respectively. The OWRC objective of not more than 15 ppm BOD or suspended solids concentration in the final effluent was exceeded 61 percent of the time for BOD and 40 percent of the time for suspended solids.

A total of 519 cu. ft. of grit was removed, an increase of 22 percent over 1966.





## AERATION SECTION

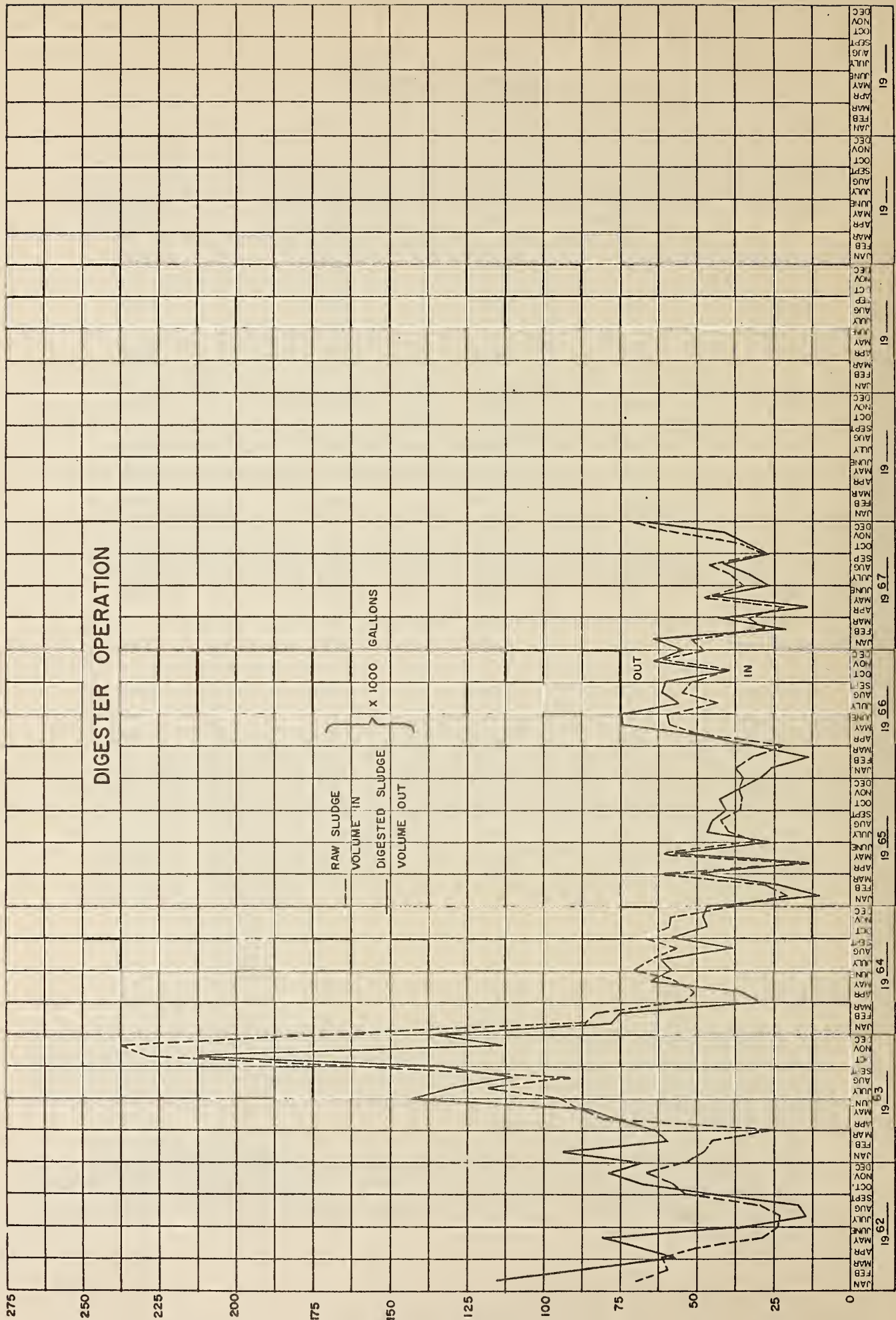
MONTH	PRIM. EFFL B.O.D. PPM.	ML.SS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. BOD. REMOVED
JANUARY	118	1315	27	1397
FEBRUARY	99	1357	26	1614
MARCH	53	2169	12	1695
APRIL	76	1465	27	1312
MAY	64	1329	20	1878
JUNE	107	1368	35	894
JULY	106	1168	26	1493
AUGUST	60	1126	16	2748
SEPTEMBER	69	1424	16	2288
OCTOBER	93	1715	20	1388
NOVEMBER	180	2070	32	990
DECEMBER	74	1844	16	1766
TOTAL	-	-	-	-
AVERAGE	96	1529	22	1622

## COMMENTS

The aeration section accepted an average of 22 pounds of BOD per 100 pounds of MLSS during the year. This is the highest aeration loading of the three Burlington plants and reflects the very high hydraulic loading on the plant. The average primary effluent BOD of 96 was down slightly from 1966 and the average MLSS concentration of 1529 ppm was essentially the same.

As there is only single stage digestion at this plant, supernatant which is returned to the primary clarifiers has a relatively high BOD strength. This is reflected in the strength of primary effluent which is only slightly reduced from the average raw sewage strengths.





## DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS		
	1000'S GALLONS	% SOLIDS	% VOL. MAT.	1000'S GALLONS	% SOLIDS	% VOL. MAT.
JAN.	51960	3.0	75.8	63938	2.9	58.4
FEB.	27620	-	-	21312	-	-
MAR.	34220	4.7	73.9	42626	2.3	58.7
APR.	20160	-	-	13563	-	-
MAY	46000	3.8	72.0	46501	4.4	43.0
JUNE	34340	-	-	27125	-	-
JULY	39120	-	-	32937	-	-
AUG.	46560	11.83	-	40687	4.6	-
SEPT.	27220	6.4	43.0	27125	5.6	31.0
OCT.	33920	4.0	71.0	32938	4.2	50.0
NOV.	58400	9.8	80.0	40688	3.9	52.3
DEC.	69600	-	-	65876	-	-
TOTAL	489120	-	-	455316	-	-
AVG.	40760	6.2	59.4	37943	4.0	41.9

## COMMENTS

A total of 489,120 gallons of raw sludge was pumped to the single stage digester at the Elizabeth Gardens plant. Due to the single stage process, virtually all raw sludge pumped to the digester is removed as digested sludge with very little supernatant being possible. The average percent solids in the raw sludge was 6.2 with 4.0 percent solids in the digested sludge. Both of these figures are acceptable. The average volatile solids reduction of 49 percent is excellent and indicates a highly efficient digester.

As there is only single stage digestion at this plant, supernatant which is returned to the primary clarifiers has a relatively high BOD strength. This is reflected in the strength of primary effluent which is only slightly reduced from the average raw sewage strengths.

## CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	25.495	(a) 523	2.19
FEBRUARY	26.994	573	2.12
MARCH	43.421	(b) 453	1.24
APRIL	43.252	663	1.53
MAY	24.177	633	1.85
JUNE	36.614	724	1.97
JULY	24.875	706	2.84
AUGUST	25.956	775	2.99
SEPTEMBER	26.826	742	2.77
OCTOBER	31.392	658	2.10
NOVEMBER	30.258	(c) 234	2.10
DECEMBER	34.403	-	-
TOTAL	383.663	6684	-
AVERAGE	31.972	608	2.06

(a) Chlorination for 29 days

(b) Chlorination for 26 days

(c) Chlorination for 11 days

### COMMENTS

Chlorination is required for effluent disinfection between May 15 and November 1. An average dosage rate of 2.21 ppm was required to maintain a residual of not less than 0.5 ppm following 15 minutes' contact.



## **CONCLUSIONS**

The Elizabeth Gardens Water Pollution Control Plant is hydraulically overloaded. In addition, there is considerable un-metered bypassing during the spring run-off period and periods of heavy rain fall. The average daily flow processed at the plant for the year was 1.05 million gallons, which is 33 percent in excess of design.

## **RECOMMENDATIONS**

Action is required by the municipality to re-direct flows in excess of the design capacity of the plant to the East End trunk sewer.

